MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2015/2016

PAM0135 –ALGEBRA

(Foundation in Information Technology / Life Sciences)

15 OCTOBER 2015
9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **TWO** pages excluding the cover page and appendix.

2. Attempt **ANY FIVE** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the Answer Booklet provided.

4. All necessary working steps **MUST** be shown.

Question 1[10 marks]

Simplify the expressions:

a. $\dfrac{x^2+5x+6}{x^2+3x+9}\times\dfrac{x^3-27}{x^3-9x}$ (4 marks)

b. $\dfrac{4x^2+x-6}{x^2+3x+2}-\dfrac{3x}{x+1}+\dfrac{5}{x+2}$ (6 marks)

Question 2 [10 marks]

a. Solve the equation: $\sqrt{8-x}=2+\sqrt{x-4}$ (5 marks)

b. Solve the following inequality: $\dfrac{1}{x+1}-\dfrac{2}{x-1}>0$ (5 marks)

Question 3 [10 marks]

a. Given $f(x)=\dfrac{2x+4}{x-3}$.

i. Find the inverse function $f^{-1}(x)$. (3 marks)

ii. Identify the domain and range of $f(x)$ and $f^{-1}(x)$. (2 marks)

b. Sketch the graph of $y=x^2, y=(x-2)^2$ and $y=(x-2)^2+6$ on the same xy-plane. Identify the minimum point for each graph. (5 marks)

Question 4 [10 marks]

Given $f(x)=x^3-4x^2+x+6$

a. Use synthetic division to find the quotient and the remainder of $\dfrac{f(x)}{x+1}$. (5 marks)

b. Factorize $f(x)$ completely. (2 marks)

c. Solve the equation: $x^3-4x^2+x+6=0$. (3 marks)

Continued...

Question 5 [10 marks]

Solve the following equations:

a. $e^{2x} - 6e^{x} + 5 = 0$ (3 marks)

b. $\log_4(4x+2) - 2\log_4(x-1) = 2$ (5 marks)

c. $2^{3x-1}.16 = 32^{x}$ (2 marks)

Question 6 [10 marks]

a. Use mathematical induction to prove that the statement
$3+6+9+...+3n = \frac{3n(n+1)}{2}$ is true for all positive integer n. (5 marks)

b. The third term and the fifth term of a geometric sequence is 26 and 416, respectively.

i. Find the first term and the common ratio of the sequence. The common ratio is a positive number. (3 marks)

ii. Find the sum of the first 5 terms of the sequence. (2 marks)

End of Page

APPENDIX

$a^2 - b^2 = (a-b)(a+b)$

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

$(a-b)^2 = a^2 - 2ab + b^2$

$(a+b)^2 = a^2 + 2ab + b^2$

$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$

$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

$\log_b b = 1$

$\log_b 1 = 0$

$\log_b (MN) = \log_b M + \log_b N$

$\log_b \left(\frac{M}{N}\right) = \log_b M - \log_b N$

$\log_b M^p = p \log_b M$

$\log_b M = \frac{\log_a M}{\log_a b}$

$a_n = a_1 + (n-1)d$

$S_n = \frac{n}{2}(a_1 + a_n)$

$a_n = a_1 r^{n-1}$

$S_n = \frac{a_1(1-r^n)}{1-r}$

$S = \frac{a_1}{1-r}$, infinite sum $|r| < 1$